



AAR Significant Activities Report October 25, 2002

SAFETY R&D

Residual Strength Test: On October 5, researchers conducted a residual strength test on a fuselage panel using the Full-Scale Aircraft Structural Test Evaluation and Research facility located at the Technical Center. This test was carried out as part of an effort to characterize multiple-site damage (MSD). The panel was first subjected to fatigue loading to allow cracks to naturally develop. During fatigue loading, researchers used nondestructive inspection (NDI) methods to monitor and record the MSD initiation, growth, and link-up. After 106,000 pressurization cycles, MSD evolved to a 16" two bay crack in the outer rivet row of the panel lap-spliced joint. The researchers then subjected the panel to quasi-static pressurization up to failure to measure the residual strength. The panel failed catastrophically along the outer rivet row exhibiting no crack turning (flapping) or arrest capability. Data from this test will be used to calibrate and validate methodologies to assess widespread fatigue damage (WFD).

MIL-HDBK-5: Over 50 participants attended the 2nd Metallic Materials Properties Development Standards (MMPDS) and 102nd MIL-HDBK-5 coordination meetings on October 7-10 in Cocoa Beach, FL. MIL-HDBK-5 is the premier source for the verified design allowables for metallic materials, fasteners, and joints used in the design and maintenance of aircraft, missiles, and space vehicles. The handbook has been in existence for over 50 years during which it has been consistently reviewed and updated by industry and the government on a consensus basis. When the United States Air Force, the lead agency managing this effort, had to stop its efforts because of severe budget constraints, the FAA determined that the continuation of MIL-HDBK-5 was critical for certification and continued airworthiness of commercial aircraft and took over as the lead agency supporting this effort. Now a core research requirement within the FAA, the Metallic Material Properties Development and Standardization (MMPDS) document is the continuation of and replacement for MIL-HDBK-5. The FAA attended this meeting to work with the industry and other government agencies to develop the MMPDS.

Airport Rescue and Firefighting (ARFF) Research Program: Keith Bagot from the Airport Technology R&D Branch, Airport Safety Section, presented an ARFF Research Program Update to the 2002 AAAP/FAA ARFF Chiefs School in Providence, RI. Over 60 ARFF fire chiefs from across the United States attended the school.

Software and Digital Systems Safety (SDSS) Research Program: On October 3, Chuck Kilgore (AAR-470) participated in the jointly sponsored FAA/NASA Software and Digital Systems Research

Meeting, held at the NASA Langley Research Center (NLRC). Key participants included John White, Associate Deputy for the Aviation Safety Program Office and Program Manager of the Single Aircraft Accident Prevention Office, Dr. Celeste Belcastro, Manager of the Health Management & Flight Critical Systems Design area, Ms. Barbara Lingberg, Sponsor of the SDSS Research Program, and Ms. Leanna Rierson, Chief Scientific & Technical Advisor for the SDSS Research Program and Aircraft Computer Software. The researchers met to discuss ways to cooperate effectively in the areas of SDSS and related NASA research efforts, and to share common SDSS research areas between the FAA and NASA. The meeting consisted of overview presentations of the SDSS Research Program and the Aviation Safety Program, as well as key presentations by contractors performing research in these areas at NASA. Finally, key agreements were achieved between the FAA and NASA in the development of a Joint Road Map and the renewal of an existing Inter-agency Agreement.

HUMAN FACTORS R&D

Line Operations Safety Audit: A conference on the University of Texas Line Operations Safety Audit (LOSA) was held in Dubai, United Arab Emirates October 14-16, 2002. The International Civil Aviation Organization (ICAO), The University of Texas Human Factors Research Project, and Emirates Airlines sponsored the meeting, which was attended by 117 participants from 27 airlines from the Middle East, Europe, Asia/Pacific, Africa, and North America, six civil aviation authorities, three aircraft manufacturers, four international organizations, two universities, and three training establishments. Robert Helmreich and James Klinec from the University of Texas were the FAA-sponsored representatives. Captain Bruce Tesmer described the LOSA experiences at Continental and demonstrated the Threat and Error Management training derived from LOSA data. The meeting provided an extraordinary opportunity to exchange information on LOSA.

SECURITY R&D

Threat Image Projection (TIP) Optimization Study: Researchers completed the TIP Optimization Study at Seattle-Tacoma International Airport (SEA). This project investigated the effect of TIP ratios or event rates on the x-ray screening performance of airport security screeners, specifically if a TIP ratio would yield optimal screener performance. TIP technology provides digitized images of threats (e.g., guns, knives, or bombs) that can be randomly superimposed onto live x-ray images of passenger baggage while screeners are on-duty at the x-ray machine. This offers the benefits of increased vigilance, exposure to threats, and threat detection performance reporting. The results of the data analysis imply that performance is significantly affected by TIP Ratio. This is indicated by the one-way Analysis of Variances calculated for the mean probability of detection (Pd), the mean probability of false alarms (Pfa), and the mean response bias, c . More specifically, 1 TIP per 25 bags elicited the highest Pd performance, while the extreme condition – the lowest frequency of TIP presentations, produced the lowest Pfa performance.

Italian Delegation: On October 11, AAR-510 met with the Italian Ministry of Interior and Defense and Directors of Security from airports in Italy to brief them on the most current work with TIP. Topics covered were the new requirements for second-generation TIP systems, the TIP network system, and the new TIP library. They also discussed the TIP Optimization Study being conducted at SEA.

Transportation Security Laboratory (TSL): The Transportation Security Administration's (TSA) TSL is drafting a Facility Master Plan that will outline all future growth required and projected for the next 5 years. The growth is in response to the increased security research and development and operational test and evaluation required since September 11, 2001, to address the needs of all modes of transportation, not just aviation. An Environmental Analysis (EA) is in progress, specifically for a new canine explosives storage area. A Statement of Work has been prepared for another EA to address the balance of the growth activities.